

Regulations and Ethical Considerations in Animal Experiments: International Laws and Islamic Perspectives

Mohammad Mehdi Naderi ^{1†}, Ali Sarvari ^{1†}, Alireza Milanifar ², Sara Borjian Boroujeni ¹,
and Mohammad Mehdi Akhondi ^{1*}

1. *Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran*

2. *Nanobiotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran*

† *These authors equally contribute to this work*

Abstract

Growing usage of animals in the research projects has drawn more attention to their welfare and ethics surrounding this practice. Dissemination of information about the existing ethical consideration and alternatives in animal experiments has two important functions; first, it increases the researcher's awareness of the possible methods of using animals in the experiment, and second, to ensure that potential users are aware of the established alternatives. For example, legislations enacted in many countries during the 1980s state that laboratory animal applications should be reduced, refined and replaced wherever possible according to principles of the 3Rs. Thus, scientists around the world tried to apply the 3Rs in their biomedical researches regarding welfare of the laboratory animals. However, the Qur'an, the holy book of Muslims, and also Hadiths contain the obligatory ways to keep and treat animals since their revelations. According to Islamic viewpoint, animals represent Allah's ability and wisdom, and humans must pay attention to their health and living conditions. Several Islamic manuscripts state that animals have their own position in the creation hierarchy and humans are responsible for supplying minimal facilities and their welfare. This paper has tried to review ethical consideration in animal experiments and regarding Islamic resources in this case to encourage providing comprehensive ethical regulations in animal experiments which its establishment could be beneficial for animal ethics committees or research institutes.

* **Corresponding author:**
Mohammad Mehdi Akhondi,
Ph.D., Reproductive
Biotechnology Research
Center, Avicenna Research
institute, ACECR, Tehran,
Iran
Tel: +98 22432020
Fax: +98 21 22432021
E-mail:
akhondi@avicenna.ac.ir
Received: 20 Feb 2012
Accepted: 14 May 2012

Avicenna J Med Biotech 2012; 4(3): 114-120

Keywords: Animals, Ethics, Research, Welfare

Introduction

Increasingly use of animals in the scientific procedures has drawn more attention to the primary ethics of these valuable creatures. There are international guidelines for use and care of animals in scientific procedures, which references have been made to some of them in this paper. One of these guidelines is represented by the National Advisory Committee for Laboratory Animal Research (NAC

LAR, Singapore), which seems to launch concise yet comprehensive considerations about the use and care of animals for scientific and research purposes. The NACLAR guidelines set out the responsibilities of all the sections involved in using and care of animals for research goals, according to accepted scientific, ethical and legal guidelines. It has been agreed that proposal to use animals for

research goals must be assessed by an Institutional Animal Care and Use Committee (IACUC) in approval of the Guidelines⁽¹⁾.

These international guidelines are classified into three parts that should be considered together as a comprehensive document:

The first part, "Guiding principles for the care and use of animals for scientific purposes", explains all principles which promote the humane and responsible care and use of animals for research and scientific goals. The concept of the principles describes the 3Rs- Replacement, Reduction and Refinement. The limitation of the principles consist all aspects of the care and use of animals for research and scientific goals including their use in teaching, field trials, environmental studies, research, diagnosis, product testing, and the production of biological products^(2,3). This part describes the responsibilities of institutions, scientists and persons who are involved in the care and use of animals for research and scientific goals. All scientific facilities which house and use animals for research goals will have to utilize according to the Guidelines to qualify for licensing from the Agri-Food and Veterinary Authority (AVA).

The second part, "Guidelines for institutional animal care and use committee", includes the guiding principles for using and care of animals for research goals and explains in detail the operational aspects pertaining to the Institutional Animal Care and Use Committee (IACUC). The IACUC is responsible for the assessment and evaluation of animal care and use programs of an institution, and is responsible for confirming that the care and use of animals for research goals and all animal experimental methods are in compliance with the guidelines. Under the guidelines, all institutions with scientific facilities have to establish their own IACUC to assume this function.

The third part, "Training guidelines", describes the training activities and requirements for users of animals and animal facilities personnel. This includes the scope of the core curriculum and the relevant core compe-

tencies, such as specific workshops for animal procedures. The Guidelines consider all animal users have to undergo appropriate training before initiation of any procedure using animals^(2,4).

However, Islam is predominant culture (more than 95%) and religion in our country and this holy religion is not silent in any case of ethical and educational concepts and it has also profound teachings on how to deal with animals. The main animal welfare regulations in Islam include considering to their natural needs, such as water, food and a suitable place to live, their living and mental condition, good health and avoidance of causing them pain, distress, or harm and unnecessary termination of their lives. These should be considered carefully by the people who work with these creatures⁽⁵⁾.

For this study, some international and Islamic resources which were relevant to dealing with animals were collected via searching online papers and eBooks, primarily or as borrowing the books from the library, secondarily (are mentioned in reference section). Thence, the resources based on subjects were classified and summarized, and finally, all the extracted points were reviewed by experts familiar with Islamic and ethical issues. Some international guidelines and Islamic considerations regarding welfare of the animals used in research or teaching, have been collected that the most important of them are outlined below.

International Guidelines of using Animals in Scientific Procedures

Animal experiments should be designed only after due consideration of animal health and the advancement of knowledge on humans or animals weighed against the potential impacts on the welfare of the animals.

Researchers should treat animals as sentient and must consider their proper care and use and the avoidance or minimization of discomfort, distress, or pain as imperatives. In this field, the 3 'R' principles must be considered at all animal experiments:

- Replacement of animal experimentation with alternative methods such as mathematical models, computer simulation and *in vitro* biological systems, which replace or complement the use of animals must be considered before embarking on any procedure involving use of animals.

- Reduction in the number of animals used which means minimum number of animals required to obtain scientifically valid results. Furthermore, scientific projects involving the use of animals must not be repeated or duplicated unnecessarily.

- Refinement of projects and techniques used to minimize impact on animals which means: (a) Animals chosen must be of an appropriate species and quality for the scientific projects concerned taking into account their specific biological properties, including genetic constitution, behavior, and microbiological, nutritional and general health status^(2,6,7).

Animal housing and management

Maintenance facilities of animals must be accurately designed, constructed, equipped and maintained to access a well standard of animal care and should follow acceptable standards of animal welfare for the particular species concerned and should fulfill scientific requirements.

In identifying the standards of animal care, the criterion should be animal well-being rather than mere ability to survive under the adverse conditions such as environmental extremes or high population densities⁽⁸⁾.

Veterinary care

Institutions should establish and operate adequate veterinary care, prepared by the attending veterinarian which includes:

The presence of appropriate facilities, equipment, personnel, and services to execute the guiding principles; using appropriate procedures to control diseases (*e.g.* vaccination and other prophylaxis, isolation and quarantine), diagnose, and treat diseases and injuries; daily observation of all animals to evaluate their health and well-being and finally certain manipulations or other tasks related

to the care and use of animals must be performed only by the attending veterinarian^(7,9).

Responsibilities of the Institutional Animal Care and Use Committees (IACUC)

The IACUC in each institute must assess the research procedures before granting approval for proposed projects or significant changes to on-going projects which the most important of its duties include:

The project proposals must describe a procedure designed to assure that discomfort, distress or pain to animals will be minimized or avoided. The researchers must provide written assurance that the activities do not unnecessarily duplicate previous experiments⁽¹⁰⁾.

Projects which may cause more than momentary distress or pain to the animals will: (i) be done with appropriate analgesics, sedatives, or anesthetics; (ii) involve in their procedure designing, consultation with the attending veterinarian; (iii) not include the use of paralytics without anesthesia.

Personnel conducting procedures on the species being maintained or studied will be appropriately qualified and trained in those procedures. Procedures that involve surgery include appropriate provision for pre operative and post-operative care of the animals according to established veterinary medical practices. No animal will be used in more than one experiment unless justified for scientific reasons by the researcher^(11,12).

Responsibilities of researchers

Researchers who use animals for scientific goals have a moral obligation to deal with the animals humanely and consider their welfare when designing the projects. Before any animal experiment begins, investigators should submit a proposal to the IACUC to demonstrate that the procedure will comply with the guiding principles. Moreover, the researchers must satisfy the IACUC of their competence to execute the techniques described in the experiment. The most important responsibilities of researchers in an animal experiment include:

- Minimize pain and distress: pain and dis-

stress cannot always be properly assessed in animals and researchers must assume that animals experience pain in a manner similar to humans. Investigators must be familiar with the normal behavior patterns of the animal species chosen.

- Prevent unacceptable study end-points: death as an end-point is often ethically unacceptable and should be fully justified. When death cannot be avoided, the procedures must be designed to result in the deaths of as few animals as possible ⁽¹³⁾.

- Avoid repeated use of animals in experiments: any animals should not be used in more than one experiment, either in the same or different projects, without the express approval of the IACUC.

- Minimize duration of experiments: experimental duration should be limited to that just sufficient to achieve the purpose of the experiment.

- Using appropriate euthanasia method: when it is necessary to kill an animal, human procedure must be used. These procedures must avoid distress, be reliable and produce rapid loss of consciousness without pain until death occurs ⁽¹⁴⁻¹⁶⁾.

- Pre-operative planning: pre-operative physical examination can often identify potential problems, such as increased anesthetic risk, which may compromise the surgical procedure. Sick animals should be rejected.

- Choosing surgical procedure: surgical procedures must be carried out under specific local or general anesthesia. There should be adequate monitoring of the depth of anesthesia and effects such as cardiovascular and respiratory depression and hypothermia.

- Post-operative care: attention to pain relief is the fundamental goal of post-operative care. Animal models of disease; animals must be used only if the disease in the animal can serve as a reliable model for research on the human disease.

- Experimental manipulation of animals' genetic material: all proposals to manipulate the genetic material of animals, their germ cells or embryos must be submitted to the

IACUC for approval.

- Experimental induction of tumors: the site for induction of neoplasia should be chosen accurately. Subcutaneous, intradermal and flank sites must be chosen wherever possible. Prior to the use of brain, footpad, and eye sites, specific justification as to the lack of any other alternative must be made to the IACUC ^(11,14,15).

Responsibilities of teachers

When animals are being used to obtain educational purpose, the person in charge of the class should: (i) accept responsibility for ensuring that the care and use of the animals is in compliance with all relevant legislation and NAACLS guidelines; (ii) allow students to anaesthetize animals or do surgery only if it is essential for their training; and (iii) be responsible for the humane killing of the animals, if required, bearing in mind that it is good practice to segregate manipulated animals from animals held under normal living conditions.

Persons supervising students who are training in research should ensure that the students are completely instructed prior to using animals and should be responsible for the ethics and the welfare of animals used by students ^(15,17).

Islamic Considerations for using Animals in Scientific Procedures

There are three sources of Islamic law which the first one is Qur'an Majeed; Hadiths or Traditions, is the second source; and Ijtihad, the endeavor of a Muslim scholar to derive a rule of divine law from Qur'an and Hadiths without relying on the views of other scholars, is the third one. Together, these three sources make up Islamic case law or "Jurisprudence" that is the guideline to be followed for any legal question. Many issues relating to animals, such as cruelty to animals, experimentation on animals and human/ animal relationship did not exist 14 centuries ago, and therefore, no specific laws were passed about them. To decide on issues developed in recent times, Islamic Jurisprudence (fiqh) has left it to Muslim Jurists (fuqaha'a)

to use their judgment by inference and analogy, based on the three above mentioned sources.

Dominion over animals

The Holy Qur'an describes that man has dominion over animals: "He (God) it is Who made you vicegerents on earth" (Holy Qur'an, 35:39), but makes clear that this responsibility is not unconditional and states what happens to those who misuse their freedom of choice and fail to conform to the conditions that limit this responsibility: "Then We reduce him (to the status of) the lowest of the low" (Holy Qur'an, 95:4, 5). "They are those whom Allah has rejected and whom He has condemned... because they served evil" (Holy Qur'an, 5:63). "They have hearts wherewith they fail to comprehend, and eyes wherewith they fail to see, and ears wherewith they fail to hear. Such (humans) are far astray from the right path" (Holy Qur'an, 7:179). There are people who take the concept of man's dominion over animals as a licentious freedom to break all the established moral rules designed to protect animal rights. Again, the Holy Qur'an urges in remonstrance: "And be not like those who say, 'We have heard,' while they do not hearken. Verily, the vilest of all creatures, in the sight of Allah, are those deaf and dumb ones who do not use their rationality" (Holy Qur'an, 8:21, 22).

Experimentation on animals

Scientific and pharmaceutical experiments on animals are being done to find cures for diseases, most of which are self-induced by our own disorderly lifestyle. Many human problems physical, mental, or spiritual are of our own creation and our wounds self-inflicted. By no stretch of imagination can we blame animals for many of our troubles and make them suffer for it. All this (experiments), and much more, is being done to satisfy human needs, most of which are non-essential, fanciful, and wasteful and for which alternative, humane products are easily available. To kill animals to satisfy the human thirst for inessentials is a contradiction in

terms within the Islamic tradition. Let us hope a day will dawn when the great religious teachings may at last begin to bear fruit; when we shall see the start of a new era, when man accords to animals the respect and status they have long deserved and for so long have been denied.

God in the Holy Qur'an, proposes all people to celebrate regarding animals and their creation: do they not regard the camels, how do they created? (Holy Qur'an, 88:17). Have they not looked at the sky above them, how we have made and dressed it up? (Holy Qur'an, 50:6). Do they not look in the dominion of the skies and the earth and all things that God has created, (animals and plants) and may be the end of their lives to be close (Holy Qur'an, 7:185).

According to these verses, it is clear that Islam has a special point of view on all the creation aspects and none of the creatures is useless⁽¹⁸⁾. Human beings are advised to deal with animals compassionately and moderately in Islamic teachings. As the prophet Mohammad said: "Only the compassionate will enter the heaven. Brothers! animals have subtle senses, so do not torture or over load them as they will be hurt"⁽¹⁹⁾.

It is morally important to determine to what extent we are allowed to use animals, especially in researches and whether we can consider ourselves as their real author. "Have you thought that we have created you for fun, and you would not return back to us?" (Holy Qur'an 23:115). The Holy Qur'an's verses and narrations of the prophet Mohammad and the immaculate Imams demonstrate that we are not allowed to terminate animals' lives; for *i.e.* there is a narration from the prophet Mohammad that He have said: If anybody kill a creature even a small bird without any reason, God will impeach him (Tarkol Atnaab 290, Nahjol Fasahe 250) because we are not their real owners⁽¹⁸⁾. In other words, animals and other creatures are not as commodities and tools and God is all creatures' real owner. Prophet Mohammad: "Do not hurt animals' face because they praise God"⁽¹⁹⁾. Based on

Islamic teachings animal welfare must be provided and the most important cases in this regard include providing their natural needs, such as water, food and a suitable place to live, appropriate mental condition, good health and to prevent them from pain, distress, or harm and unnecessary termination of their lives⁽¹⁸⁾.

Previous studies conducted in our country have demonstrated that since Islam is predominant religion in Iran and according to Islamic consideration, all creatures are in the divine presence, then nobody have authority to interfere animal's life without God's consent. Animals are part of our real life, so we can use them only with respect to the position for which are created. It must be in an ethical manner to benefit from the animals because they feel pain and distress certainly⁽¹⁸⁾. Another study in our country has tried to introduce some codes about animals in four sections; maintenance of animals and transporting them, husbandry and the personnel and researcher's knowledge⁽²⁰⁾. Finally according to the Islamic believes and regarding to animal's positions in the nature we have to protect animal well being in the research and educational procedures.

Conclusion

Increasingly, humans transgress their ecological responsibilities. Instead of living within a circle of ecological interest, humans act in self-interest and at the expense of a relationship within nature that is caring and responsible. Millions of animals are used every year in many extremely painful and distressing scientific procedures. Legislation of animal experimentation in modern societies is based on the supposition that this is ethically acceptable when certain more-or less defined formal (*e.g.* logistical, technical) demands and ethical principles are met⁽²¹⁾.

In comparison with the other Abrahamic Judaic and Christian traditions, there are more teachings about the treatment, care and respecting animal's ethics in Islam. Islamic teachings exhibit an ingrained environmental

ethic of stewardship and a way of life for Muslims that are rooted firmly in seeking harmony with the environment. Islamic considerations have recommended humans to provide water and food for animals and respect to their welfare and safety. The development of biomedical sciences further obligates researchers to respect principles of caring and using animals because of expanded animals' utilization. It is hoped that utilization of ethical considerations in animal experiments improves the scientific design of the researches and related hygienic standards^(14,15).

This paper has tried to review ethical consideration in animal experiments and regarding Islamic resources in this case to establish comprehensive ethical regulations in animal experiments, which its establishment could be beneficial and useful for animal ethics committees or research institutes.

References

1. Hau J, Van Hoosier GL. Animal research ethics. In: Olsson IAS, Robinson P, Pritchett K, Sandoe P (eds). Handbook of laboratory animal science. Boca Raton: CRC Press; 2003, 13-31.
2. Hau J, Van Hoosier GL. An overview of global legislation, regulations and policies on the use of animals for scientific research, testing, or education. In: Bayne K, deGreeve P (eds). Handbook of laboratory animal science. USA: Boca Raton; 2003, 31-42.
3. Suckow MA, Douglas FA, Weichbrod RH. Bioethics and laboratory animal research. In: Gnadt JW, Leland SE (eds). Management of laboratory animal care and use programs. Boca Raton: CRC Press; 2002, 92-106.
4. Hubrecht R, Kirkwood J. Implementing the three Rs in research using animals. In: Richmond J (ed). UFAW handbook on the care and management of laboratory animals. Vol. 2. London: Blackwell publishing; 2010, 23-37.
5. Naiini A, Rabani M. Institutional Policies and Responsibilities. In: Animal rights according to Quran viewpoints. Quarterly periodical of Shahed University 1999;26:43-50. Persian.
6. Barthold SW, bayne AK, Davis MA. Animal care and use program. In: Ballinger MB (ed). Guide for the care and use of laboratory animals: National Research Council. Washington: National Academy Press; 2011, 11-20.

7. Olfert ED, McWilliam AA. Control of animal pain in research, teaching and Testing. In: Amyx, HL (ed). Guide to the care and use of experimental animals. Vol. 1. Ottawa: Canadian Council on Animal Care; 1993, 188-189.
8. Ruys T. Laboratory animal facilities. In: Ruys T (ed). Handbook of facilities planning. New York: Van Nostrand Reinhold; 1991, 193-197.
9. Fox JG, Anderson LC, Loew FM, Quimby FW. Laws, regulation and policies affecting the use of laboratory animals. In: Anderson LC (ed). Laboratory animal medicine. Maryland: Academic Press; 2002, 19-32.
10. Applied Research Ethics National Association (ARENA) and Office of Laboratory Animal Welfare (OLAW). Institutional animal care and use committee guidebook. Bethesda: National government publication; 2002.
11. National health and medical research council. Australian code of practice for the care and use of animals for scientific purposes. Canberra: Australian Government; 2004, 21-32.
12. Reilly JS. Animal welfare considerations. In: Reilly JS, Rose MA (eds). Euthanasia of animals used for scientific purposes. Adelaide: Anzccart; 2001, 6-15.
13. International Air Transport Association. Live animals regulations. 36th ed. Montreal: International Air Transport Association; 2009.
14. Flecknell PA. The relief of pain in laboratory animals. *Lab Animals* 1984;(18):147-160.
15. Beaver BV, Reed WSL, McKiernan B. Report of the AVMA panel on euthanasia. *J Am Vet Med Assoc* 2001;218(5):669-696.
16. Barthold SW, Bayne KA, Davis MA. Guide for the care and use of laboratory animals. Washington: National Academy Press; 2011.
17. Hawkins P. Recognizing and assessing pain, suffering and distress in laboratory animals-a survey of current practice in the UK with recommendations. *Lab Anim* 2002;36:378-395.
18. Mobasher M, Aramesh K, Aldavoud SJ, Ashraf-ganjooei N, Divsalar K, Phillips CJC, et al. Proposing a national ethical framework for animal research in Iran. *Iranian J Publ Health* 2008;37(1): 39-46.
19. Alhor Alameli M, Vasael Alshieh. *Tehran Maktab aleslamieh* 8:351-353,397. Arabic.
20. Ale-Davoud SJ, Javadzade-bolouri A, Sadeghi H, Sabzghabie MAM, Latifi SM, Norouzian R, et al. Preparation of ethic codes for studies on laboratory animals. *J Babol Univ Med Sci* 2006;8(3):55-64.
21. Bennison R. Ecological inclusion and nonhuman animals in the Islamic tradition. Koninklijke Brill NV: Leiden; 2003.